

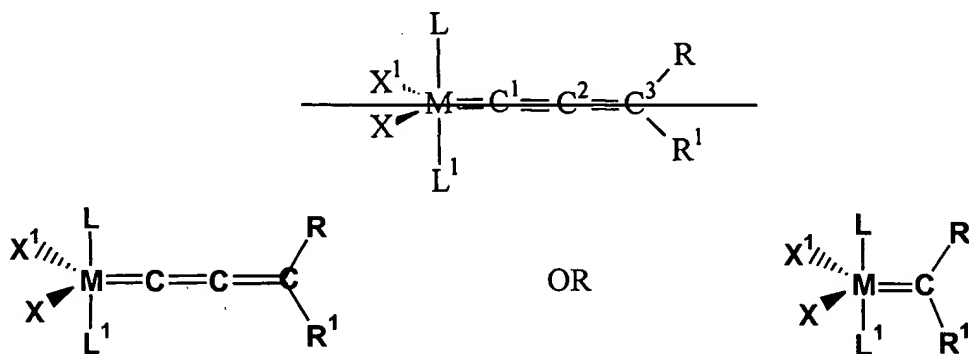
## AMENDMENTS

This listing of claims will replace all prior versions, and listing, of claims in the application:

### In the Claims:

Claims 1-8 (cancelled)

Claim 9 (currently amended): A catalytic complex of the formula:



wherein M is Os or Ru;

~~C<sup>1</sup> and C<sup>2</sup> are sp hybridized carbons and C<sup>3</sup> is an sp<sup>2</sup> hybridized carbon,~~  
~~wherein either or both of C<sup>1</sup> and C<sup>2</sup> are optionally absent;~~

R and R<sup>1</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxy carbonyl, aryl, C<sub>1</sub>-C<sub>20</sub> carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, ~~C<sub>2</sub>-C<sub>20</sub> alkynyloxy~~, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, ~~or and~~ aryloxy, each R and R<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy;

X and X<sup>1</sup> are independently selected from the group consisting of anionic ligands;

L is selected from the group consisting of phosphine, sulfonated phosphine, phosphite, phosphinite, phosphonite, ether, amine, amide, sulfoxide, carbonyl, nitrosyl, pyridine and thioether; and

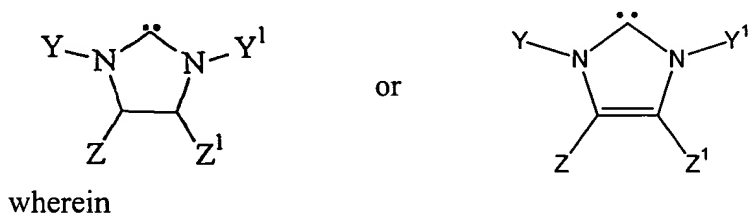
L<sup>1</sup> is a nucleophilic carbene.

Claim 10 (cancelled)

Claim 11 (previously amended): A catalytic complex according to claim 9, wherein L is a phosphine.

Claim 12 (original): A catalytic complex according to claim 9, wherein at least 2 of X, X<sup>1</sup>, L or L<sup>1</sup> are bonded together to form a multidentate ligand.

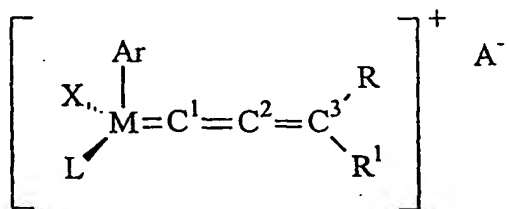
Claim 13 (currently amended): A catalytic complex according to claim 9, wherein said nucleophilic carbene is of the formula:



Y and Y<sup>1</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxy carbonyl, aryl, C<sub>1</sub>-C<sub>20</sub> carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, ~~C<sub>2</sub>-C<sub>20</sub> alkynyloxy~~, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, ~~or and~~ aryloxy, each Y and Y<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy and;

Z and Z<sup>1</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxy carbonyl, aryl, C<sub>1</sub>-C<sub>20</sub> carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, ~~C<sub>2</sub>-C<sub>20</sub> alkynyloxy~~, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, ~~or and~~ aryloxy, each Z and Z<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy.

Claim 14 (currently amended): A catalytic complex of the formula:



wherein

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C<sup>1</sup> and C<sup>2</sup> are sp-hybridized carbons and C<sup>3</sup> is an sp<sup>2</sup>-hybridized carbon, wherein either or both of C<sup>1</sup> and C<sup>2</sup> are optionally absent;

M is selected from the group consisting of Os and Ru;

R and R<sup>1</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxycarbonyl, aryl, C<sub>1</sub>-C<sub>20</sub> carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, ~~C<sub>2</sub>-C<sub>20</sub> alkynyloxy~~, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, ~~or and~~ aryloxy, each R and R<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy;

X is an anionic ligand; ~~and~~

L is a nucleophilic carbene; ~~and~~

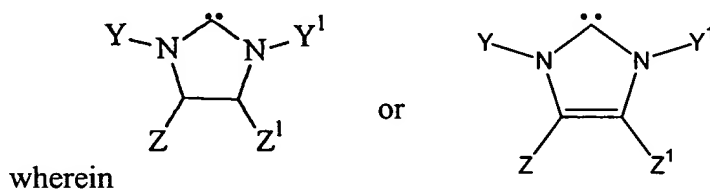
Ar is an aryl substituent, bonded to M by an  $\eta^6$  bond; and

A<sup>-</sup> is an inorganic anion or an organic anion.

Claim 15 (cancelled)

Claim 16 (cancelled)

Claim 17 (currently amended): A catalytic complex according to claim 14, wherein said nucleophilic carbene is of the formula:



hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxycarbonyl, aryl, C<sub>1</sub>-C<sub>20</sub> carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, ~~C<sub>2</sub>-C<sub>20</sub> alkynyloxy~~, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, ~~or and~~ aryloxy, each Y and Y<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy and;

Z and Z<sup>1</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxycarbonyl, aryl, C<sub>1</sub>-C<sub>20</sub> carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, ~~C<sub>2</sub>-C<sub>20</sub> alkynyloxy~~, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, ~~or and~~

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aryloxy, each Z and Z<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy.

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Claim 18 (original): A method of making a nucleophilic carbene, said method comprising:

- a) contacting a substituted or unsubstituted aniline with an approximately one-half equimolar amount of paraformaldehyde under an inert atmosphere to make a first reaction mixture;
- b) heating said first reaction mixture until said paraformaldehyde dissolves;
- c) adding an approximately one-half equimolar amount of a dialkoxyacetaldehyde to make a second reaction mixture; and
- d) heating said second reaction mixture for a time and under conditions sufficient to make a nucleophilic carbene.

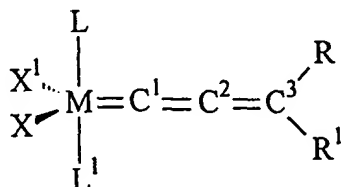
Claim 19 (original): The method of claim 18, wherein said aniline is 2, 4, 6-trimethylaniline.

Claim 20 (original): The method of claim 18, wherein said aniline is 2, 6-diisopropylaniline.

Claim 21 (original): The method of claim 18, further comprising the step of hydrogenating the nucleophilic carbene to produce a non-aromatic nucleophilic carbene.

Claim 22 (cancelled)

Claim 23 (currently amended): A method of performing ring closing metathesis, said method comprising contacting a diene with a catalytic complex under conditions appropriate, and for a time sufficient to produce a cyclic alkene, wherein the catalytic complex has the formula:



wherein M is Os or Ru;

C<sup>1</sup> and C<sup>2</sup> are sp-hybridized carbons and C<sup>3</sup> is a sp<sup>2</sup>-hybridized carbon, wherein either or both of C<sup>1</sup> and C<sup>2</sup> are optionally absent;

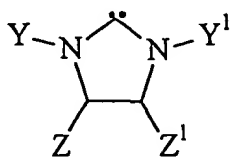
R and R<sup>1</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxy carbonyl, aryl, C<sub>1</sub>-C<sub>20</sub> carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, ~~C<sub>2</sub>-C<sub>20</sub> alkynyloxy~~, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, ~~or and~~ aryloxy, each R and R<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy;

X and X<sup>1</sup> are independently selected from the group consisting of anionic ligands;

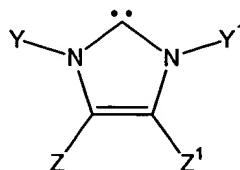
L is selected from the group consisting of phosphine, sulfonated phosphine, phosphite, phosphinite, phosphonite, ether, amine, amide, sulfoxide, carbonyl, nitrosyl, pyridine and thioether; and

L<sup>1</sup> is a nucleophilic carbene.

Claim 24 (currently amended): The method of claim 23, wherein the nucleophilic carbene has the formula:



or

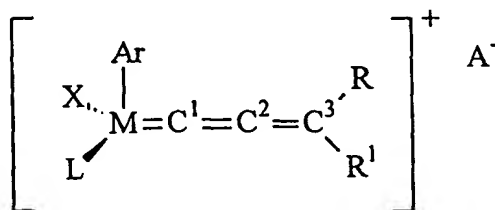


wherein

Y and Y<sup>1</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxy carbonyl, aryl, C<sub>1</sub>-C<sub>20</sub> carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, ~~C<sub>2</sub>-C<sub>20</sub> alkynyloxy~~, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, ~~or and~~ aryloxy, each Y and Y<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy and;

25 Z and Z<sup>1</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxy carbonyl, aryl, C<sub>1</sub>-C<sub>20</sub> carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, ~~C<sub>2</sub>-C<sub>20</sub> alkynyloxy~~, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, ~~or and~~ aryloxy, each Z and Z<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy.

Claim 25 (currently amended): A method of performing ring closing metathesis, said method comprising contacting a diene with a catalytic complex under conditions appropriate, and for a time sufficient to produce a cyclic alkene, wherein the catalytic complex has the formula:



wherein

C<sup>1</sup> and C<sup>2</sup> are sp-hybridized carbons and C<sup>3</sup> is an sp<sup>2</sup>-hybridized carbon, wherein either or both of C<sup>1</sup> and C<sup>2</sup> are optionally absent;

M is selected from the group consisting of Os and Ru;

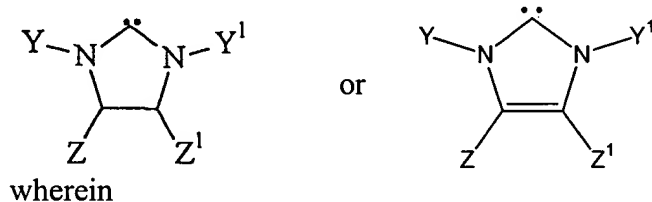
R and R<sup>1</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxy carbonyl, aryl, C<sub>1</sub>-C<sub>20</sub> carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, ~~C<sub>2</sub>-C<sub>20</sub> alkynyloxy~~, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, ~~or and~~ aryloxy, each R and R<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy;

36 X is an anionic ligand; and

L is a nucleophilic carbene; and

Ar is an aryl substituent, bonded to M by an  $\eta^6$  bond; and  
A<sup>-</sup> is an inorganic anion or an organic anion.

Claim 26. (currently amended): The method of claim 25, wherein the nucleophilic carbene has the formula:



Y and Y<sup>1</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxy carbonyl, aryl, C<sub>1</sub>-C<sub>20</sub> carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, ~~C<sub>2</sub>-C<sub>20</sub> alkynyloxy~~, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, ~~or and~~ aryloxy, each Y and Y<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy and;

Z and Z<sup>1</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxy carbonyl, aryl, C<sub>1</sub>-C<sub>20</sub> carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, ~~C<sub>2</sub>-C<sub>20</sub> alkynyloxy~~, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, ~~or and~~ aryloxy, each Z and Z<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy.

Claim 27. (previously amended): The catalytic complex according to claim 9, wherein X and X<sup>1</sup> are independently selected from the group consisting of halide, carboxylate, alkoxy, aryloxy, and alkyl sulfonate.

Claim 28. (previously amended) The catalytic complex according to claim 27, wherein X and X<sup>1</sup> are both chloride.

Claim 29. (previously added): The catalytic complex of claim 9, wherein the nucleophilic carbene ligand comprises a carbene carbon further bonded to two heteroatoms

having electronegativity greater than that of carbon, wherein the heteroatoms are independently selected from the group consisting of nitrogen, oxygen, and sulfur.

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Claim 30. (currently amended): The catalytic complex of claim 29, wherein the nucleophilic carbene ligand comprises a saturated or unsaturated ~~1,3-diheteroaromatic cyclic~~ 1,3-diheterocyclic compound.

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Claim 31. (previously added): The catalytic complex of claim 9, wherein the complex is linked to a solid support by means of a link between at least one of said anionic ligands and said solid support.

Claim 32. (previously amended): The catalytic complex according to claim 9, wherein the complex is linked to a solid support by means of a link between the nucleophilic carbene and said solid support.

Claim 33. (previously amended): The catalytic complex according to claim 14, wherein X is selected from the group consisting of halide, carboxylate, alkoxy, aryloxy, and alkyl sulfonate.

Claim 34. (previously amended): The catalytic complex according to claim 33, wherein X is chloride.

Claim 35. (previously added): The catalytic complex of claim 14, wherein the nucleophilic carbene ligand comprises a carbene carbon further bonded to two heteroatoms having electronegativity greater than that of carbon, wherein the heteroatoms are independently selected from the group consisting of nitrogen, oxygen, and sulfur.

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Claim 36. (currently amended): The catalytic complex of claim 35, wherein the nucleophilic carbene ligand comprises a saturated or unsaturated ~~1,3-diheteroaromatic cyclic~~ 1,3-diheterocyclic compound.

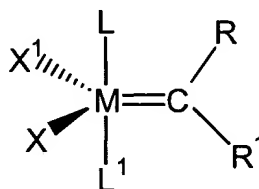
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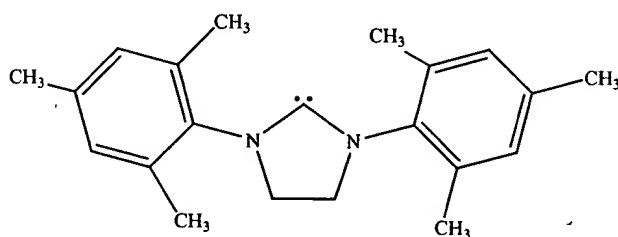
Claim 37. (previously added): The catalytic complex of claim 14, wherein the complex is linked to a solid support by means of a link between said anionic ligand and said solid support.

Claim 38. (previously added): The catalytic complex of claim 14, wherein the complex is linked to a solid support by means of a link between said nucleophilic carbene and said solid support.

Claim 39. (previously added): The catalytic complex according to claim 9, wherein the catalytic complex has the formula:



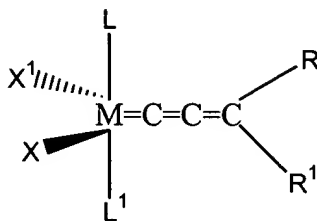
Claim 40. (previously added): The catalytic complex according to claim 39, wherein L is -P(cyclohexyl)<sub>3</sub>, -P(cyclopentyl)<sub>3</sub>, or -PPh<sub>3</sub>; and L¹ is



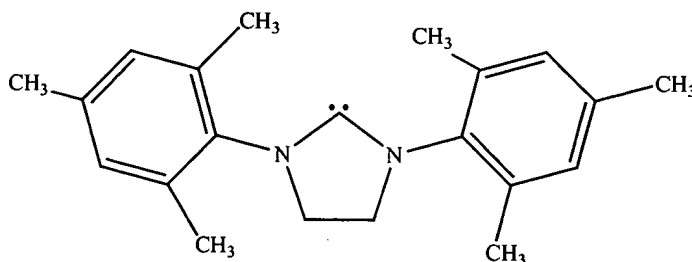
Claim 41. (cancelled)✓

Claim 42. (cancelled)✓

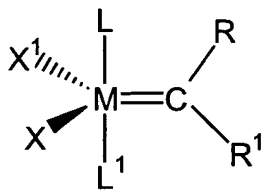
Claim 43. (previously added): The catalytic complex according to claim 9, wherein the catalytic complex has the formula:



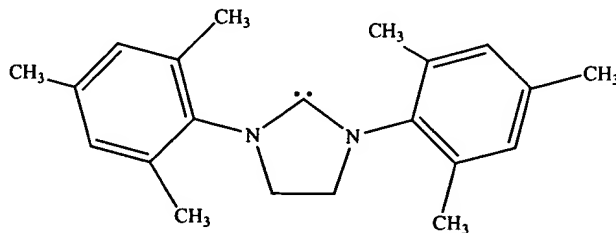
Claim 44. (previously added): The catalytic complex according to claim 43, wherein L is -P(cyclohexyl)<sub>3</sub>, -P(cyclopentyl)<sub>3</sub>, or -PPh<sub>3</sub>; and L¹ is



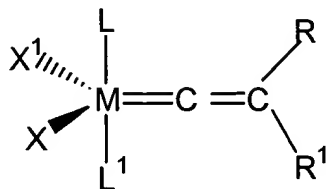
Claim 45. (previously added): The method according to claim 23, wherein the catalytic complex has the formula:



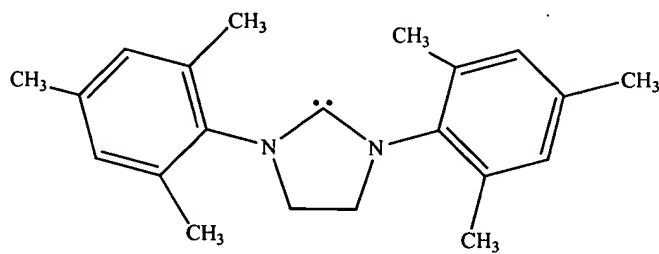
Claim 46. (previously added): The method according to claim 45, wherein L is -P(cyclohexyl)<sub>3</sub>, -P(cyclopentyl)<sub>3</sub>, or -PPh<sub>3</sub>; and L¹ is



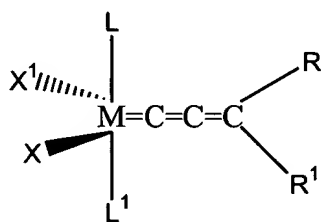
Claim 47. (previously added): The method according to claim 23, wherein the catalytic complex has the formula:



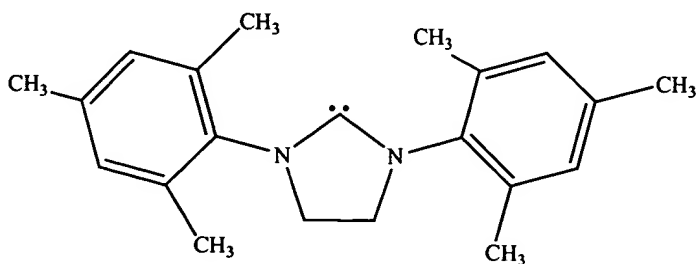
Claim 48. (previously added): The method according to claim 47, wherein L is -P(cyclohexyl)<sub>3</sub>, -P(cyclopentyl)<sub>3</sub>, or -PPh<sub>3</sub>; and L¹ is



Claim 49. (previously added): The method according to claim 23, wherein the catalytic complex has the formula:



Claim 50 (previously added): The method according to claim 49, wherein L is -P(cyclohexyl)<sub>3</sub>, -P(cyclopentyl)<sub>3</sub>, or -PPh<sub>3</sub>; and L¹ is



Claim 51 (previously added): A catalytic complex according to claim 13, wherein Y and Y<sup>1</sup> are both 2,4,6-trimethylphenyl and Z and Z<sup>1</sup> are both hydrogen.

Claim 52 (previously added): A catalytic complex according to claim 13, wherein Y and Y<sup>1</sup> are both 2,6-diisopropylphenyl and Z and Z<sup>1</sup> are both hydrogen.

Claim 53 (previously added): A catalytic complex according to claim 17, wherein Y and Y<sup>1</sup> are both 2,4,6-trimethylphenyl and Z and Z<sup>1</sup> are both hydrogen.

Claim 54 (previously added): The catalytic complex according to claim 17, wherein Y and Y<sup>1</sup> are both 2,6-diisopropylphenyl and Z and Z<sup>1</sup> are both hydrogen.

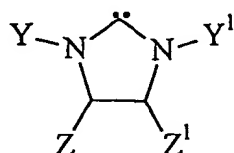
Claim 55. (previously added): The method according to claim 24, wherein Y and Y<sup>1</sup> are both 2,4,6-trimethylphenyl and Z and Z<sup>1</sup> are both hydrogen.

Claim 56 (previously added): The method according to claim 24, wherein Y and Y<sup>1</sup> are both 2,6-diisopropylphenyl and Z and Z<sup>1</sup> are both hydrogen.

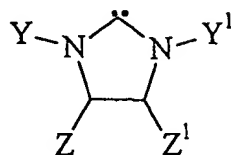
Claim 57 (previously added): The method according to claim 26, wherein Y and Y<sup>1</sup> are both 2,4,6-trimethylphenyl and Z and Z<sup>1</sup> are both hydrogen.

Claim 58 (previously added): The method according to claim 26, wherein Y and Y<sup>1</sup> are both 2,6-diisopropylphenyl and Z and Z<sup>1</sup> are both hydrogen.

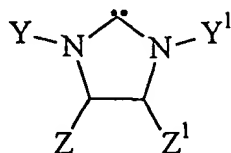
Claim 59 (previously added): A catalytic complex according to claim 13, wherein said nucleophilic carbene is of the formula:



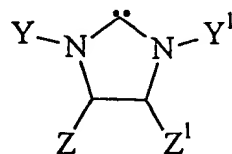
Claim 60 (previously added): A catalytic complex according to claim 17, wherein said nucleophilic carbene is of the formula:



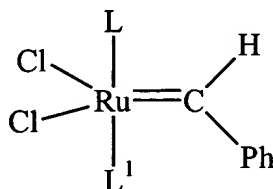
Claim 61 (previously added): The method of claim 24, wherein the nucleophilic carbene has the formula:



Claim 62 (previously added): The method of claim 26, wherein the nucleophilic carbene has the formula:



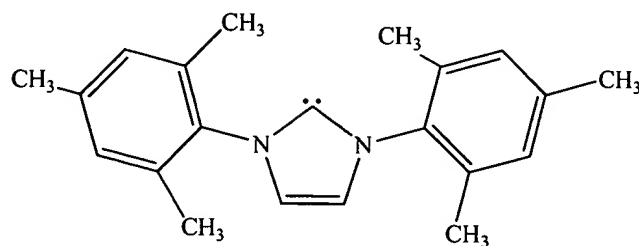
Claim 63 (previously added): A catalytic complex of the formula:



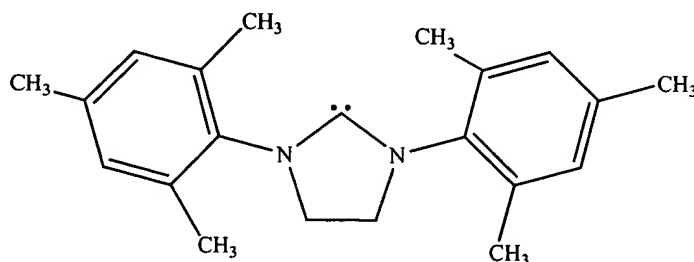
wherein

L is -P(phenyl)<sub>3</sub>, -P(cyclohexyl)<sub>3</sub>, or -P(cyclopentyl)<sub>3</sub>; and  
L¹ is a nucleophilic carbene.

Claim 64 (previously added): The catalytic complex of claim 63, wherein  $L^1$  is

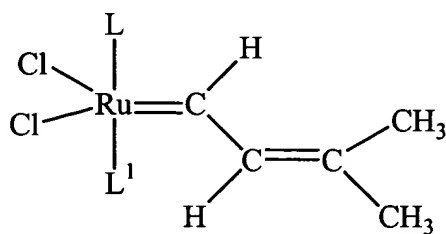


Claim 65 (previously added): The catalytic complex of claim 63, wherein  $L^1$  is



Claims 66-70 (cancelled) ✓

Claim 71 (currently amended): A catalytic complex of the formula:

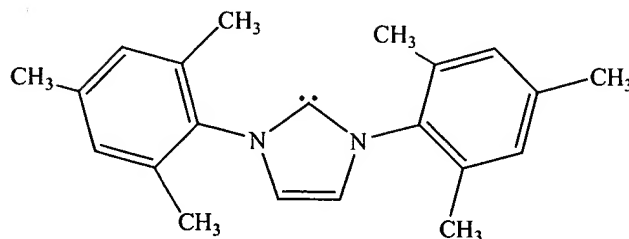


wherein

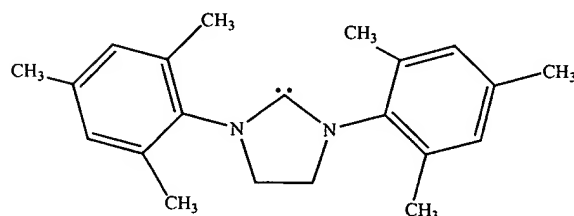
$L$  is  $-P(\text{phenyl})_3$ ,  $-P(\text{cyclohexyl})_3$ , or  $-P(\text{cyclopentyl})_3$   ~~$-P(\text{phenyl})_3$ ,  $-P(\text{cyclohexyl})_3$ , or  $-P(\text{cyclopentyl})_3$~~ ; and  
 $L^1$  is a nucleophilic carbene.

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Claim 72 (previously added): The catalytic complex of claim 71, wherein  $L^1$  is



Claim 73 (previously added): The catalytic complex of claim 71, wherein  $L^1$  is



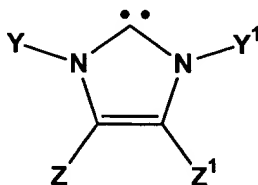
Claim 74-76 (cancelled)

Claim 77 (previously added): The method of claim 23, wherein the diene is a diterminal diene.

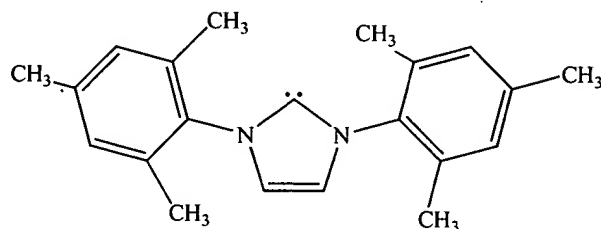
Claim 78 (previously added): The method of claim 25, wherein the diene is a diterminal diene.

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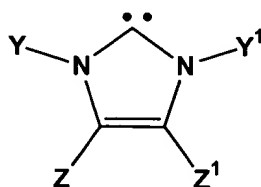
Claim 79 (new): The catalytic complex according to claim 13, wherein the nucleophilic carbene is of the formula:



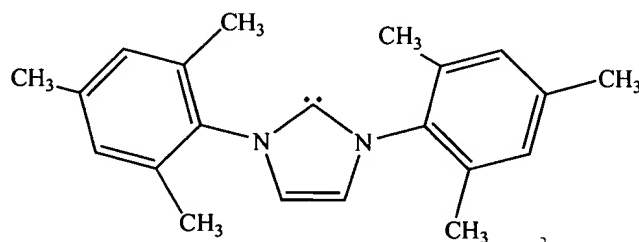
Claim 80 (new): The catalytic complex according to claim 79, wherein the nucleophilic carbene is of the formula:



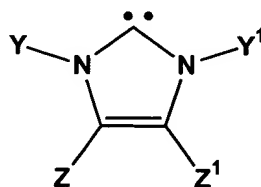
Claim 81 (new): The catalytic complex according to claim 17, wherein the nucleophilic carbene is of the formula



Claim 82 (new): The catalytic complex according to claim 81, wherein the nucleophilic carbene is of the formula:

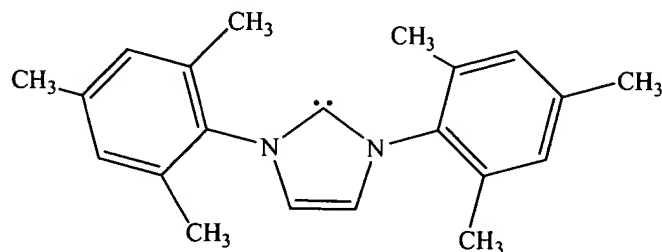


Claim 83 (new): The method according to claim 24, wherein the nucleophilic carbene is of the formula:

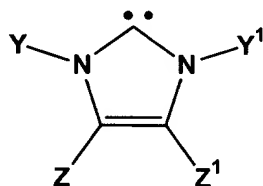




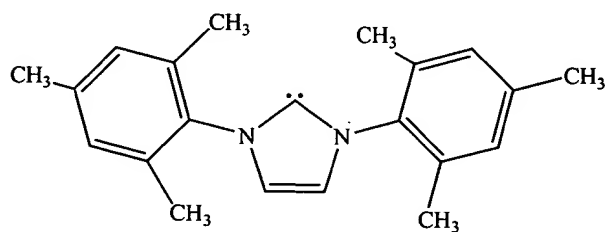
Claim 84 (new): The method according to claim 83, wherein the nucleophilic carbene is of the formula:



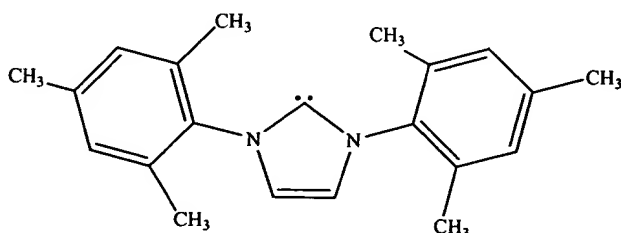
Claim 85 (new): The method according to claim 26, wherein the nucleophilic carbene is of the formula:



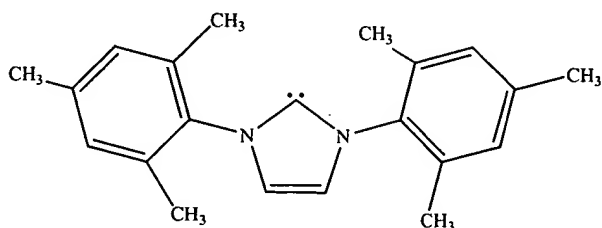
Claim 86 (new): The method according to claim 85, wherein the nucleophilic carbene is of the formula:



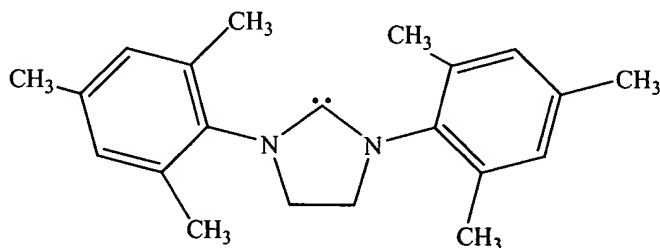
Claim 87. (new): The catalytic complex according to claim 39, wherein L is -P(cyclohexyl)<sub>3</sub>, -P(cyclopentyl)<sub>3</sub>, or -PPh<sub>3</sub>; and L<sup>1</sup> is of the formula:



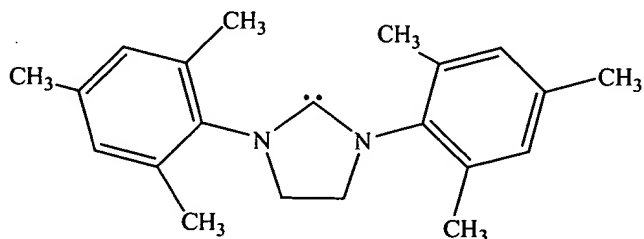
Claim 88. (new): The catalytic complex according to claim 43, wherein L is -  
P(cyclohexyl)<sub>3</sub>, -P(cyclopentyl)<sub>3</sub>, or -PPh<sub>3</sub>; and L<sup>1</sup> is of the formula:



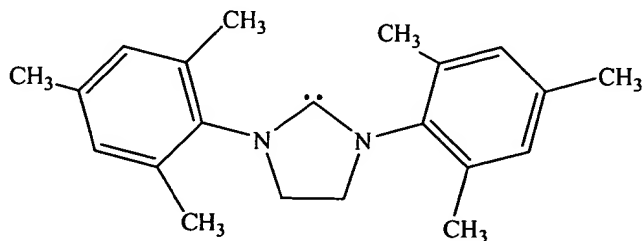
Claim 89 (new): The catalytic complex according to claim 59, wherein the  
nucleophilic carbene is of the formula:



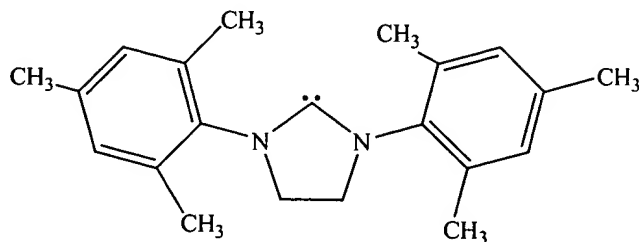
Claim 90 (new): The catalytic complex according to claim 60, wherein the  
nucleophilic carbene is of the formula



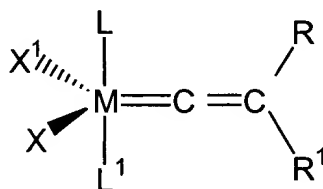
Claim 91 (new): The method according to claim 61, wherein the nucleophilic carbene is  
of the formula:



Claim 92 (new): The method according to claim 62, wherein the nucleophilic carbene is of the formula:



Claim 93 (new): A catalytic complex of the formula:



wherein M is Os or Ru;

R and R<sup>1</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxy carbonyl, aryl, C<sub>1</sub>-C<sub>20</sub> carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, and aryloxy, each R and R<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy;

X and X<sup>1</sup> are independently selected from the group consisting of anionic ligands;

L is selected from the group consisting of phosphine, sulfonated phosphine, phosphite, phosphinite, phosphonite, ether, amine, amide, sulfoxide, carbonyl, nitrosyl, pyridine and thioether;

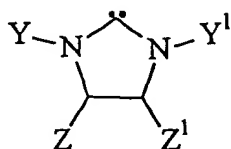
L<sup>1</sup> is a nucleophilic carbene; and

wherein the catalytic complex has one or more further characterization selected from the group consisting of

(1) at least 2 of X, X<sup>1</sup>, L or L<sup>1</sup> are bonded together to form a multidentate ligand,

(2) the complex is linked to a solid support by means of a link between the solid support and the nucleophilic carbene or by means of a link between the solid support and at least one of the anionic ligands;

(3)  $L^1$  has the formula

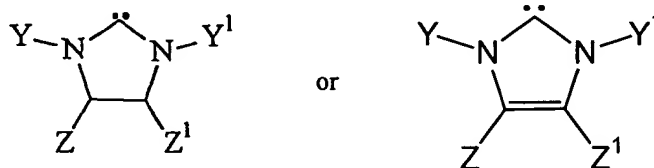


where, Y and  $Y^1$  are independently selected from the group consisting of hydrogen,  $C_1$ - $C_{20}$  alkyl,  $C_2$ - $C_{20}$  alkenyl,  $C_2$ - $C_{20}$  alkynyl,  $C_2$ - $C_{20}$  alkoxy carbonyl, aryl,  $C_1$ - $C_{20}$  carboxylate,  $C_1$ - $C_{20}$  alkoxy,  $C_2$ - $C_{20}$  alkenyloxy,  $C_2$ - $C_{20}$  alkynyloxy, and aryloxy, each Y and  $Y^1$  optionally being substituted with  $C_1$ - $C_5$  alkyl, halogen,  $C_1$ - $C_6$  alkoxy, or with a phenyl group substituted with halogen,  $C_1$ - $C_5$  alkyl or  $C_1$ - $C_5$  alkoxy; and

Z and  $Z^1$  are independently selected from the group consisting of hydrogen,  $C_1$ - $C_{20}$  alkyl,  $C_2$ - $C_{20}$  alkenyl,  $C_2$ - $C_{20}$  alkynyl,  $C_2$ - $C_{20}$  alkoxy carbonyl, aryl,  $C_1$ - $C_{20}$  carboxylate,  $C_1$ - $C_{20}$  alkoxy,  $C_2$ - $C_{20}$  alkenyloxy,  $C_2$ - $C_{20}$  alkynyloxy, and aryloxy, each Z and  $Z^1$  optionally being substituted with  $C_1$ - $C_5$  alkyl, halogen,  $C_1$ - $C_6$  alkoxy, or with a phenyl group substituted with halogen,  $C_1$ - $C_5$  alkyl or  $C_1$ - $C_5$  alkoxy; and

(4) any combination of the foregoing characteristics.

Claim 94 (new): The catalytic complex of claim 93, wherein said nucleophilic carbene is of the formula:



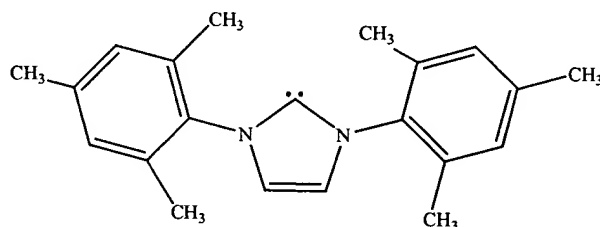
wherein

Y and  $Y^1$  are independently selected from the group consisting of hydrogen,  $C_1$ - $C_{20}$  alkyl,  $C_2$ - $C_{20}$  alkenyl,  $C_2$ - $C_{20}$  alkynyl,  $C_2$ - $C_{20}$  alkoxy carbonyl, aryl,  $C_1$ - $C_{20}$  carboxylate,  $C_1$ - $C_{20}$  alkoxy,  $C_2$ - $C_{20}$  alkenyloxy,  $C_2$ - $C_{20}$  alkynyloxy, and aryloxy, each Y and  $Y^1$

optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy and;

Z and Z<sup>1</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxy carbonyl, aryl, C<sub>1</sub>-C<sub>20</sub> carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, and aryloxy, each Z and Z<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy.

Claim 95. (new): The catalytic complex according to claim 94, wherein the nucleophilic carbene is of the formula:



and wherein the further characterization of the catalytic complex is selected from the group consisting of

- (1) at least 2 of X, X<sup>1</sup>, L or L<sup>1</sup> are bonded together to form a multidentate ligand, and
- (2) the complex is linked to a solid support by means of a link between the solid support and the nucleophilic carbene or by means of a link between the solid support and at least one of the anionic ligands.

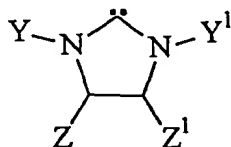
Claim 96 (new): The catalytic complex of claim 93, wherein the further characterization of the catalytic complex is that at least 2 of X, X<sup>1</sup>, L or L<sup>1</sup> are bonded together to form a multidentate ligand.

Claim 97 (new): The catalytic complex of claim 93, wherein the further characterization of the catalytic complex is that the complex is linked to a solid support by means of a link between the solid support and the nucleophilic carbene or by means of a link between the solid support and at least one of the anionic ligands;

Claim 98 (new): The catalytic complex of claim 97, wherein the complex is linked to a solid support by means of a link between at least one of the anionic ligands and the solid support.

Claim 99 (new): The catalytic complex according to claim 97, wherein the complex is linked to a solid support by means of a link between the nucleophilic carbene and said solid support.

Claim 100 (new): The catalytic complex of claim 93, wherein the further characterization of the catalytic complex is that  $L^1$  has the formula



Claim 101 (new): A catalytic complex according to claim 94, wherein Y and Y<sup>1</sup> are both 2,4,6-trimethylphenyl and Z and Z<sup>1</sup> are both hydrogen.

Claim 102 (new): A catalytic complex according to claim 94, wherein Y and Y<sup>1</sup> are both 2,6-diisopropylphenyl and Z and Z<sup>1</sup> are both hydrogen.

Claim 103 (new): The catalytic complex according to claim 93, wherein L is a phosphine.

Claim 104 (new): The catalytic complex according to claim 103, wherein L is -P(cyclohexyl)<sub>3</sub>, -P(cyclopentyl)<sub>3</sub>, or -PPh<sub>3</sub>.

Claim 105 (new): The catalytic complex according to claim 93, wherein X and X<sup>1</sup> are independently selected from the group consisting of halide, carboxylate, alkoxy, aryloxy, and alkyl sulfonate.

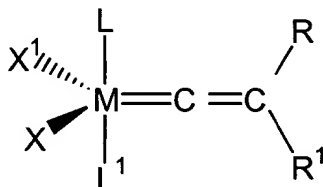
Claim 106 (new): The catalytic complex according to claim 105, wherein X and X<sup>1</sup> are both chloride.

Claim 107 (new): A method for synthesizing a polymer material, the method comprising contacting a monomer composition with the catalytic complex as described in any of claims 9, 14, 39, 40, 43, 44, 63, 64, 65, 71, 72, 73, 87, 88, 93, 98 or 99.

Claim 108 (new): The method of claim 107, wherein the monomer composition comprises a plurality of olefin molecules.

Claim 109 (new): The method of claim 107, wherein the olefin molecules are cyclic olefin molecules.

Claim 110 (new): A catalytic complex of the formula:



wherein M is Os or Ru;

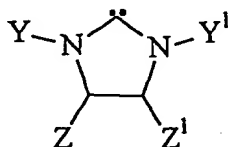
R is hydrogen;

R<sup>1</sup> is tert-butyl;

X and X<sup>1</sup> are chloride;

L is -P(phenyl)<sub>3</sub>, -P(cyclohexyl)<sub>3</sub>, or -P(cyclopentyl)<sub>3</sub>; and

L<sup>1</sup> is a nucleophilic carbene of the formula



where, Y and Y<sup>1</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxy carbonyl, aryl, C<sub>1</sub>-C<sub>20</sub>

carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, and aryloxy, each Y and Y<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy; and

Z and Z<sup>1</sup> are independently selected from the group consisting of hydrogen, C<sub>1</sub>-C<sub>20</sub> alkyl, C<sub>2</sub>-C<sub>20</sub> alkenyl, C<sub>2</sub>-C<sub>20</sub> alkynyl, C<sub>2</sub>-C<sub>20</sub> alkoxycarbonyl, aryl, C<sub>1</sub>-C<sub>20</sub> carboxylate, C<sub>1</sub>-C<sub>20</sub> alkoxy, C<sub>2</sub>-C<sub>20</sub> alkenyloxy, C<sub>2</sub>-C<sub>20</sub> alkynyloxy, and aryloxy, each Z and Z<sup>1</sup> optionally being substituted with C<sub>1</sub>-C<sub>5</sub> alkyl, halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, or with a phenyl group substituted with halogen, C<sub>1</sub>-C<sub>5</sub> alkyl or C<sub>1</sub>-C<sub>5</sub> alkoxy.

Claim 111 (new): A catalytic complex according to claim 110, wherein Y and Y<sup>1</sup> are both 2,4,6-trimethylphenyl and Z and Z<sup>1</sup> are both hydrogen.

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